

## **Inhalation Exposure and Intake Dose Model Improvements**

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The NERL/EMRB scientists have been improving its human exposure/intake dose model (i.e., Stochastic Human Exposure and Dose Simulation [SHEDS] model) by performing high-priority human exposure assessment research. One such area of research is in enhancing population-based inhalation exposure and dose modeling, and the EMRB staff have developed a coordinated modeling program to improve methodologies and algorithms utilized within various exposure models in the U.S. Environmental Protection Agency's (U.S. EPA) program offices.

For example, the U.S. EPA's Office of Air Quality Planning and Standards (OAQPS) uses a set of regulatory models, including the Air Pollutants Exposure (APEX) model, Total Risk Integrated Methodology for Exposure (TRIM.Expo), and the Hazardous Air Pollutants Exposure Model (HAPEM) to evaluate alternative national ambient air quality standards (NAAQS) and emission standards for toxic, hazardous air pollutants (HAPS). While the SHEDS model is most similar in structure and function to the APEX model, all four models (as well as others) use the EMRB's Consolidated Human Activity Database (CHAD) as their source of human activity data. Since CHAD data are fundamental to both the NERL's and OAQPS's exposure models, the EMRB staff have been evaluating the validity and effectiveness of the CHAD to address significant research questions posed by external scientific review agencies. Results of the first three evaluation efforts have been published in peer-reviewed journals; subsequently, the OAQPS is modifying its exposure modeling approach to account for the EMRB research findings. The same is true for the new 2000 U.S. Census commuting data that the EMRB has obtained and modified; it currently is being input into the OAQPS models to replace the 1990 version. In addition, EMRB scientists have developed new ventilation (breathing)-to-oxygen consumption relationships that are an integral part of the intake dose-estimating algorithms used in all of the models.

This presentation highlights recent human exposure model improvements and products developed by the EMRB in coordination with scientists in the OAQPS and provides insight into how these products are used by the OAQPS in its regulatory process. Besides providing a status report of inhalation model developments and improvements, work planned to evaluate the performance and efficacy of the SHEDS and OAQPS models is also discussed. Findings from these model evaluation projects are expected to provide detailed guidance on future EMRB research planning and program development.

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